

DEVELOPMENT OF HIGH AND MID TC TRANSITION EDGE SUPERCONDUCTING (TES) BOLOMETERS ON 1 TO 5 μm THICK MONOLITHIC SAPPHIRE SUBSTRATES FOR SPACE-BASED FAR IR APPLICATIONS

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ABSTRACT

Long duration space-based observations can be done by using radiatively cooled high Tc (~ 90 K) and mid Tc (~ 39 K) TES bolometers when the use of cryogenics or high power consuming cryocoolers are not feasible. At focal plane temperatures above 77 K and at wavelengths $>30 \mu\text{m}$ high Tc bolometers perform better than photon detectors. And with the recently discovered superconductivity of MgB2 at 39 K, even better sensitivity can be expected from TES bolometers in the Far IR. We have already developed single pixel high Tc TES bolometers with GdBcO thin films on sapphire substrates. The measured D^* is $2 \times 10^{10} \text{ cmHz}^{1/2}/\text{W}$. We are now developing a 2-D array of 1 to 5 μm thick monolithic sapphire membranes structure for GdBcO and MgB2 thin films deposition. This paper will present recently achieved milestones and the status of our detector development effort.

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